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**MEMORANDUM**

**DATE:** 29 March 1990  
**TO:** Distribution  
**SUBJECT:** Review of Phase III Work Plan  
Allen Harbor Risk Assessment Pilot Study

Thank you for your thoughtful review of the Phase III supplement to the Work/Quality Assurance Project Plan (W/QAPjP) for the Allen Harbor Risk Assessment Pilot Study (RAPS). We have elected to respond to all reviewers' comments in a single correspondence to enhance the efficiency of communication, and to provide each of you with the opportunity to examine the comments of others. Several of the comments are well taken, and modifications to the W/QAPjP have been made as described below. There also appears to be some misunderstanding of the rationale and goals of the RAPS. Before addressing your specific concerns, the historical context and intent of this case study are provided to enhance understanding of study objectives.

In response to the requirements and provisions of CERCLA, the U.S. Navy has undertaken a number of research and development activities to provide technologies and approaches to define the extent and effects of hazardous waste impacts on aquatic systems. In October 1988, the U.S. Navy Naval Ocean Systems Center (NOSC) and the U.S. EPA Environmental Research Laboratory - Narragansett (ERLN) entered into a technical Memorandum of Agreement (MOA) to "develop cooperative research and monitoring activities related to [the conduct of] ecological risk assessments at potentially impacted aquatic sites on or adjacent to Navy facilities" (MOA, 1988). Further, information obtained through the conduct of case studies under this MOA would be used to identify a general approach for conducting ecological risk assessments (ERAs) at other Navy and non-Navy aquatic sites. It is important to note that the broad scope of these activities was to be of an R&D nature, rather than of a routine nature. It was intended, however, that the case studies were to support the mandated investigations of each Navy activity.

The Allen Harbor RAPS was the first case study developed under the MOA. As stated in the RAPS Scope of Work (MOA, 1988), the objective of this activity was to "Conduct [a] cooperative [aquatic] ecological risk assessment at NCBC Davisville to determine the presence and extent of adverse impact and [to] assist in selection of remedial alternatives." This ERA was to involve expertise from a range of environmental fields, and to incorporate state-of-the-art methodologies developed by NOSC, ERLN, and other agencies and institutions. Several planning meetings involving all parties (including EPA Region I personnel) were convened to develop the phased approach currently employed in the RAPS, and to identify the specific activities of Phase I. With the concurrence of the activity Commanding Officer, the NCBC Davisville TRC, NOSC, and ERLN, sampling activities associated with Phase I were initiated in October 1988. NCBC Davisville was added to the NPL effective November 1989, one year after initiation of the RAPS.

As originally planned, the specific activities of Phases II and III were to be identified based upon information obtained in the previous phase(s). Phase-specific work plans were developed in consultation with participating research groups and the NCBC TRC. Draft work plans were presented to the TRC, and recommended modifications were incorporated as appropriate.

With this information as background, responses to individual Phase III work plan review comments (in order of receipt) are itemized below. Original comment structures and numbering schemes are preserved in each set of responses, and the review comments are attached for reference. Broad comments or those expressed verbally are summarized for completeness. Modifications incorporated in the revised work plan (attached) are described as appropriate.

## **RESPONSES TO COMMENTS OF MR. JOSEPH MIGLIORE, RIDEM WATER RESOURCES**

During a phone conversation on 15 February, Mr. Migliore expressed no major concerns with the draft work plan.

## **RESPONSES TO COMMENTS OF MR. JEFFREY CRAWFORD, RIDEM AIR AND HAZARDOUS MATERIALS**

### *General Comments*

1. Seep water and sediment samples used in laboratory bioassays will be obtained from landfill sites which displayed the highest level of contamination and toxicological threat as quantified in Phases I and II. These attributes were quantified independently by exposure medium. Not surprisingly, "worst case" media occurred at the same site. Information to this effect is now incorporated in the Phase III work plan.
2. Phase III chemical analyses will involve a subset of the suite of contaminants measured in Phase I. These include PCB (quantified as Aroclors 1242 and 1254, and total PCB), pesticides, PAHs, and metals (Cu, Zn, Cr, Ni, Pb, Cd, Mn, and Fe). All test media will be subjected to the full set of analyses. Butyltins will not be quantified.
3. Specific bioassays to be conducted for each exposure medium are listed in Table 1 of the work plan. SOPs describing each assay are appended to the revised work plan.
4. Exposure times for each bioassay are described in the appended SOPs.
5. Results from short-term toxicity tests are not directly applicable to "life-time" exposure situations. Although some of these proposed assays involve chronic endpoints, they typically are not "life-time" measurements. Methods for extrapolating toxicity information of this nature are not sufficiently developed, although it may be possible to model population responses using these data (as alluded to in the work plan). Generally, long-term impact only can be implied from

bioassays results. The question of long-term toxicological effects was addressed in Phase I by assessing the status of resident biota. Additionally, the long-term monitoring plan will provide additional information on chronic effects.

6. References to sampling protocols are included in the revised work plan.
7. Samples will be archived to provide sufficient material for reanalysis (chemical and/or biological), should such re-examination be necessary. In essence, they will provide backup insurance against information loss.
8. No new analyses will be conducted to identify the sources of exposure media (see response to Comment 1 above). Approximately half a dozen such determinations occurred during Phase I, and 18 (9 seep, 9 sediment) occurred during Phase II.
9. Table 1 enumerates exposure-response bioassays only. The proposed *Mya arenaria* study is of a different nature, and was therefore not included. *Mytilus edulis* was not proposed as a test species primarily for logistic reasons (quantity of exposure medium needed, etc.). Rationale used in selection of bioassays is listed on p. 4 of the original draft work plan.

#### *Specific Comments*

1. Preparation of Narragansett Bay hypersaline brine follows an ERLN SOP, which is appended to the revised work plan. Water used to create hypersaline brine is obtained from ERLN's seawater intake, originating from a water intake off the ERLN dock. Although detailed chemical analyses of the hypersaline brine itself have not been conducted, past analyses of water from this source indicates no contamination.

From past examinations, the seep water is largely fresh. Volumes must be adjusted through addition of approximately 30 parts of 100 ppt hypersaline brine to 70 parts water to result in a 30 ppt salinity test medium for marine species. The maximum concentration of original seep water is therefore 70%. Given the rapid dilution of seep water into Allen Harbor, this concentration is likely to be much greater than experienced by organisms in the field.

2. Central Long Island Sound (CLIS) sediment is one of the most characterized "reference" sediments utilized by ERLN in laboratory investigations. Extensive biological, chemical, and physical data exist with respect to this material. Although some elevation in selected contaminants has been observed, biological effects resulting from exposure to CLIS sediment are virtually nonexistent. CLIS sediment was proposed over other, less well characterized "reference" sediments (North Jamestown, Narrow River) because of this extensive characterization.

Undiluted Allen Harbor sediment will represent the highest dose treatment in each sediment bioassay. Salinity-adjusted (but otherwise undiluted) seep water will represent the highest dose treatment in each seep water bioassay.

3. Chemical extract procedures are described in an SOP appended to the revised work plan. Although not specifically approved by EPA Region I (to our knowledge), it (or modified versions) has been used at ERLN for a number of years, and is generally accepted by the research community. Whereas bioassays involving sediment extracts

do not utilize sediments as the exposure medium, the comment regarding sediment:water ratio is not relevant.

See responses to Comment 1 above.

4. The location from which the landfill soil sample is (was) obtained will depend upon the feasibility and logistics of obtaining such a sample. Ideally, this sample would derive from a "hot spot" as determined by the survey activities of TRC-ÉCI. Because it may not be possible to obtain such a sample, this proposed activity will be performed opportunistically. This possibility is reflected in the revised work plan.
5. Allen Harbor treatments in this study will consist of undiluted landfill sediment.

As presented in the Phase I Final Report and at previous NCBC Davisville TRC meetings, hematopoietic neoplasia was observed in *Mya arenaria* at several locations in Narragansett Bay. However, affliction rate generally decreased with increasing distance from the landfill.

This study will provide information regarding the role of landfill contaminants in neoplasia development. Assuming no response in the negative control treatment (reference sediment, absence of suspected infectious agent), positive results in the (Allen Harbor, absence of suspected infectious agent) treatment will implicate landfill contaminants as initiators of the neoplasia. Enhanced response in the (Allen Harbor, presence of suspected agent) treatment over the positive control treatment (reference sediment, presence of suspected agent) will implicate landfill contaminants as promoter of the neoplastic response. The design will not allow us to identify specific contaminant classes as initiators or promoters.

## RESPONSES TO COMMENTS OF DR. KENNETH FINKELSTEIN, NOAA

### *General Comments*

1. The level of detail provided in this supplement is consistent with that established in the original W/QAPjP and Phase II supplement. In a general sense, the supplement is intended to communicate the overall goals and approaches of Phase III, to specify sampling and analysis activities, to identify phase-specific deliverables, and to delineate phase budgets. The specifics of statistical analysis and information synthesis are not included. Prior to the implementation of each phase, however, presentations are made to the NCBC Davisville TRC explaining these aspects in more detail. Because you were not present at the 13 February TRC meeting during which Phase III was discussed, your comment is understandable. Rather than generating EC50-type measurements, the proposed assays will be used to generate continuous exposure-response information useful in predicting biological response over a range of exposure conditions. Current ecological risk can then be defined as a function of exposure in space. This information also can be used to translate observed or modeled temporal variation in exposure conditions into risk. We therefore believe (as stated in the sentence you quoted) that in conjunction with Phase I and II information, these data will constitute an ERA.
2. As indicated the sentence you quoted in Comment 1, our intent is to use the

information obtained in Phases I, II, and III to characterize risk. We do not intend to provide further description of the natural history of Allen Harbor in Phase III. Phase I activities were directed in part to that description. Recall, however, that the aims of the MOA are not to conduct routine environmental evaluations, but rather to develop new and meaningful approaches to ecological risk assessment.

3. This point is well taken. All proposed bioassays have associated ERLN Standard Operating Procedures (SOPs). These are appended to the revised W/QAPjP supplement.

#### *Specific Comments*


4. The Phase III work plan does propose activities other than exposure-response bioassays. Specifically, the very lesion responses to which you refer are being addressed in a laboratory experiment. We have already conducted numerous field assessments (population assessments, mussel and mysid deployments, bioaccumulation assessments) in previous phases. Our intent in Phase III is to examine risk associated with the landfill itself. Bioassays are one of the most direct means of doing so. This information was provided in Section 7.A of the work plan.
5. The term "chronic mortality" is a standard one in toxicology. It refers to that mortality associated with long-term exposure to low-level contaminant stress. Assay durations are described in the appended SOPs.
6. See the response to Comment 3 above.
7. Locations displaying the highest contaminant levels and greatest toxicological threat will be identified through examination of chemistry and toxicity data obtained during Phases I and II. This explanation is now incorporated in the revised work plan.

#### **RESPONSES TO COMMENTS COLLATED BY MS. CAROL KEATING, EPA REGION I**

Neither general nor specific comments were provided. Rather, a meeting between EPA Region I, NOSC, and ERLN was suggested for mid-April to discuss Phase III activities. This meeting has been scheduled for 8 April at ERLN.

Again, thank you for your interest and comments. Your involvement in this capacity will enhance our research efforts with respect to the RAPS and future MOA activities. Please feel free to contact Mr. Robert Johnston or me at any time.

Sincerely,



Wayne R. Munns, Jr., Ph.D.  
Project Manager and Principle Investigator

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**ATTACHMENTS:** Revised Phase III supplement to the Allen Harbor RAPS W/QAPjP  
Comments of J. Crawford (letter dated 25 February 1991)  
Comments of K. Finkelstein (letter dated 28 February 1991)  
Comments of EPA Region I (portion of letter dated 14 March 1991)